

good knowledge of the methods employed in charting. The suggested modifications have not sufficient authority back of them to warrant consideration as factors in charting rainfall.

THE DATE LINE IN THE PACIFIC OCEAN.

By JAMES PAGE, United States Hydrographic Office, dated September 5, 1902.

In charting meteorological data from the various land stations in the Pacific Ocean confusion is apt to arise owing to the lack of uniformity on the part of the several island groups as to the calendar date employed. Certain of the islands to the westward or on the Asiatic side of the meridian of 180° employ the American date, while others to the eastward or on the American side of the meridian employ the Asiatic date, which is of course one day later than the American; 8 a. m. of Monday, June 9, in west longitude, becoming 8 a. m. of Tuesday, June 10, as soon as east longitude is attained, and similarly for other hours and days.

It is obviously desirable that local practise should, in this respect, conform as nearly as circumstances will permit with the astronomical rule which makes the date line follow the meridian of 180° throughout. At the present time the approximation is very close, although this has not always been the case. A notable exception was that of the Philippine Islands, which, prior to 1845, observed the American date; their discoverer, Magellan, having approached them from America, and the islands themselves having for many years maintained an active trade with Acapulco on the Mexican coast. The island of Celebes, on the other hand, in the same longitude as Luzon (120° E.), observed the Asiatic date. An event described as having taken place at 8 a. m. of Monday, June 5, in Philippine annals, would thus be described as having occurred at the same hour of Tuesday, June 6, in the annals of Celebes. To remove this incongruity the Manila authorities accordingly decreed that December 31, 1844, should be dropped from the calendar, December 30 being immediately followed by January 1, 1845. Prior to its purchase by the United States in 1867 the Asiatic (Russian) date was employed throughout the whole Territory of Alaska, while the Samoan archipelago clung to the Australian date until July 4, 1892.

At the present time the islands of the Pacific keep their dates, as shown in the following list, compiled from the Pilot Chart of the North Atlantic Ocean for September, 1899, published by the United States Hydrographic Office:

American date: Alaska, St. Lawrence Island, all the Aleutian Islands (Attu, the most westerly, is situated in longitude 173° E.), Morell Island, Phoenix Islands, Samoan Islands.

Asiatic date (one day later than the American date): Siberia, Kamchatka, Copper Island, Komandorski Island, Marshall Islands, Gilbert Islands, Ellice Islands, Fiji Islands, New Zealand, Chatham Island.

When it is Saturday the first day of the month throughout the islands on the eastern or American side of the date line it is Sunday the second day of the month throughout those on the western or Asiatic side, and this is true of any hour of the day or night.

In order to make their dates agree with those of their ports of call, it is the universal custom of shipmasters when westward bound to omit from the log the date immediately succeeding that on which the meridian of 180° is crossed, and when eastward bound to repeat this date, notice of this fact being given and events on board dated accordingly. In the case of simultaneous observations aboard such vessels, the matter is further complicated by the fact that, in addition to this change of date, the local time is constantly changing. The United States Hydrographic Office has for several years past been engaged in the construction of daily synoptic weather charts of the North Pacific Ocean, showing the barometric pressure, the force and direction of the wind, the proportion of

cloudy sky, etc., prevailing each day at the hour of mean noon on the meridian of Greenwich, the basis of these charts being the daily simultaneous observations taken at this hour aboard the ships scattered over the entire ocean. As a vessel approaches the meridian of 180° from the eastward, the hour of observation, which is the local or ship's time corresponding to Greenwich mean noon, becomes successively earlier and earlier, and, upon crossing the meridian, changes from a. m. of the given date to p. m. of the next immediate following date. To illustrate by an example, assume that a vessel westward bound and making four degrees of longitude daily, finds herself at the instant of Greenwich mean noon of June 15 in longitude 179° west. The local date and time of the meteorological observation will be June 15, 0 h. 4 m., a. m. The meridian of 180° will be crossed about 6 a. m. of June 15, which, by virtue of crossing this meridian, immediately becomes 6 a. m. of June 16, and the local date and time of the next Greenwich mean noon meteorological observation (the vessel having reached 177° east), will be June 16, 11 h. 48 m. p. m. Many observers, however, mindful of the necessity of dropping a day from the ship's local record, consider it essential to drop a day from the Greenwich mean noon record, and (incorrectly) date the second observation June 17, 11 h. 48 m. p. m., and likewise all subsequent observations throughout the voyage one day in advance of the actual date. The same error, but with opposite sign, is of equally frequent occurrence in the case of eastward bound ships, all Greenwich mean noon observations subsequent to crossing the one hundred and eightieth meridian bearing date one day behind the truth. In tabulating or plotting simultaneous meteorological observations at sea it is therefore highly essential to carefully scrutinize the record in this respect.

French vessels reckon their longitude from the meridian of Paris ($2^\circ 20'$ east of Greenwich) and change their date upon crossing the meridian 180° distant from this, i. e., in longitude $177^\circ 40'$ west of Greenwich.

Spanish vessels reckon their longitude from San Fernando ($6^\circ 14'$ west of Greenwich) and would naturally change the date in longitude $173^\circ 46'$ east of Greenwich. The number of vessels of Spanish nationality engaged in this trade is, however, small and it is impossible to speak with precision as to their custom in this respect.

CLIMATOLOGY OF COSTA RICA.

Communicated by H. PITTIER, Director, Physical Geographic Institute.

[For tables see the last page of this REVIEW preceding the charts.]

Notes on the weather.—On the Pacific slope the precipitation was deficient and irregularly distributed. In San Jose the pressure was about normal, the temperature slightly below the average, and the rainfall 163 mm. against a normal of 241 mm. The sky was generally cloudy, with only 103 hours of sunshine, the normal being 119 hours. The prospects for the next coffee crop are poor. On the Atlantic slope the rainfall was generally in excess of the normal, occasioning everywhere inundations and landslides.

Notes on earthquakes.—July 5, 5^h 17^m a. m., slight shock, NW-SE, intensity III, duration 9 seconds. July 8, 3^h 03^m p. m., very light shock, NW-SE, intensity I, duration 3 seconds. July 8, 11^h 51^m p. m., light shock, NNW-SSE, intensity II, duration 9 seconds. July 18, 11^h 24^m a. m., tremors. July 19, 9^h 05^m p. m., pretty strong shock, E-W, intensity III, duration 9 seconds. July 22, 4^h p. m., very light, NW-SE, intensity I, durations 4 seconds. July 25, 11^h 25^m a. m., slight, N-S, intensity II, duration 4 seconds. July 29, 8^h 05^m p. m., very slight, E-W, intensity I, duration 4 seconds. Contrary to newspaper reports the Costa Rican volcanoes have become quiet, and there are absolutely no indications of unusual activity.